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LISTS OF SPECIES

Fishes collected with an artisanal fish trap in Barra de Camaratuba estuary, northeastern Brazil

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ABSTRACT: A list of the species of fishes collected in the Barra de Camaratuba estuary, Paraiba, Brazil, is presented. Specimens were collected on a monthly basis between January and December 2012, using a fishing technique known locally as "Tomada", an artisanal fish trap like a barrier. Forty species were collected, belonging to 27 genera and 20 families of the Teleostei. The Gerreidae was the most representative family, with 6 species, followed by the Lutjanidae and Tetraodontidae, with four species each.

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INTRODUCTION

Fishes, with about 28,000 valid species (Nelson 2006), have a wide variation in morphology and biology, inhabiting marine, estuarine and freshwater environments. They are important not only for the adequate functioning of the aquatic environments, but also as food supply and income generation, mainly for local communities.

Local estuarine fishermen in the Brazilian northeastern coast traditionally use the "Tomada", a type of net barrier, as a common fishing practice. This fishing method consists of setting trapping barriers made of fishing nets, so that the fish that enter the mangrove channels are kept trapped along the maximum length permitted by the physical geography of the site. The fishing nets are set during low spring tide. They are suspended with high tide, enabling the capture of fish that enter the estuary. In order to score and lift the nets, fishermen use roots and branches of local vegetation, *Rhizophora mangle* L. For temporary net barriers he outlets of the tidal flat or mangrove border are blocked by a net approximately 200 m long and 3 m high. The net is positioned during high tide and fastened on wooden poles, which are stuck in the mud after the fish have step into the inundated mangroves. Fish are collected from the small pools that form during the low tide, six hours after locking up the tidal flat. The "Tomada" differs from another fishing technique, the "Tapagem", which is widely used in the north-northeastern Brazil. "Tapagem" consists of a trap used by fishermen in the tidal creek, at the mouth of small rivers and streams that are influenced by the tide (Nery 1995; Barletta *et al*. 1998).

The "Tomada" is a fishing practice with low selectivity level in terms of the fish species caught, and captures both adults and juveniles. Therefore, this fishing practice might have an impact on the ecosystem. Despite this, there is very little information regarding the species caught by this traditional fishing method. The goal of this study is to provide information on the fish assemblages captured by "Tomada" in the Barra de Camaratuba estuary, Paraiba, Brazil.

MATERIALS AND METHODS

Specimens were collected at the mouth of the Rio Camaratuba (Figure 1) in the Barra de Camaratuba estuary (06°22′55″ S, 34°59′31″W), located in the district of Barra de Camaratuba, near Mataraca town, 110 km north from João Pessoa, the capital of Paraiba State. According to Köeppen's classification (Alvares *et al*. 2014), the Rio Camaratuba basin has a hot, humid climate (Aw), with a drainage area of 635,60 km^2, annual rainfall of 700–1600 mm, minimum temperature of 20–24°C and maximum temperature of 28–33°C. The estuarine area consists of physiognomically preserved vegetation, in a part of the mangrove occupied by the Indigenous Reservation of Cumaru, of the Potiguara tribe (Baía da Traição Municipality, Paraiba State).

Specimens were collected monthly in the Barra de Camaratuba estuary, from January to December 2012. Each month, the local fishermen selected the sampling locations on the basis of their knowledge of the system. Sampling took place during spring tides, using the "Tomada", a non-selective fishing technique. Harvest always occurred at low tide, in the morning. In Barra de Camaratuba estuary, the local fishermen set 10 nets of 2.0 cm mesh between the opposite knots, reaching 300 m in length and lining the edges of the mangrove.

After being caught, fish were counted and identified with the aid of relevant literature (*e.g.*, Figueiredo and Menezes 1978, 1980, 2000; Menezes and Figueiredo 1980, 1985; Allen 1985; Harrison 2002; Marceniuk 2005; Marceniuk and Menezes 2007). Vouchers were deposited at the Federal University of Paraiba (UFPB 9570 to UFPB 9595).

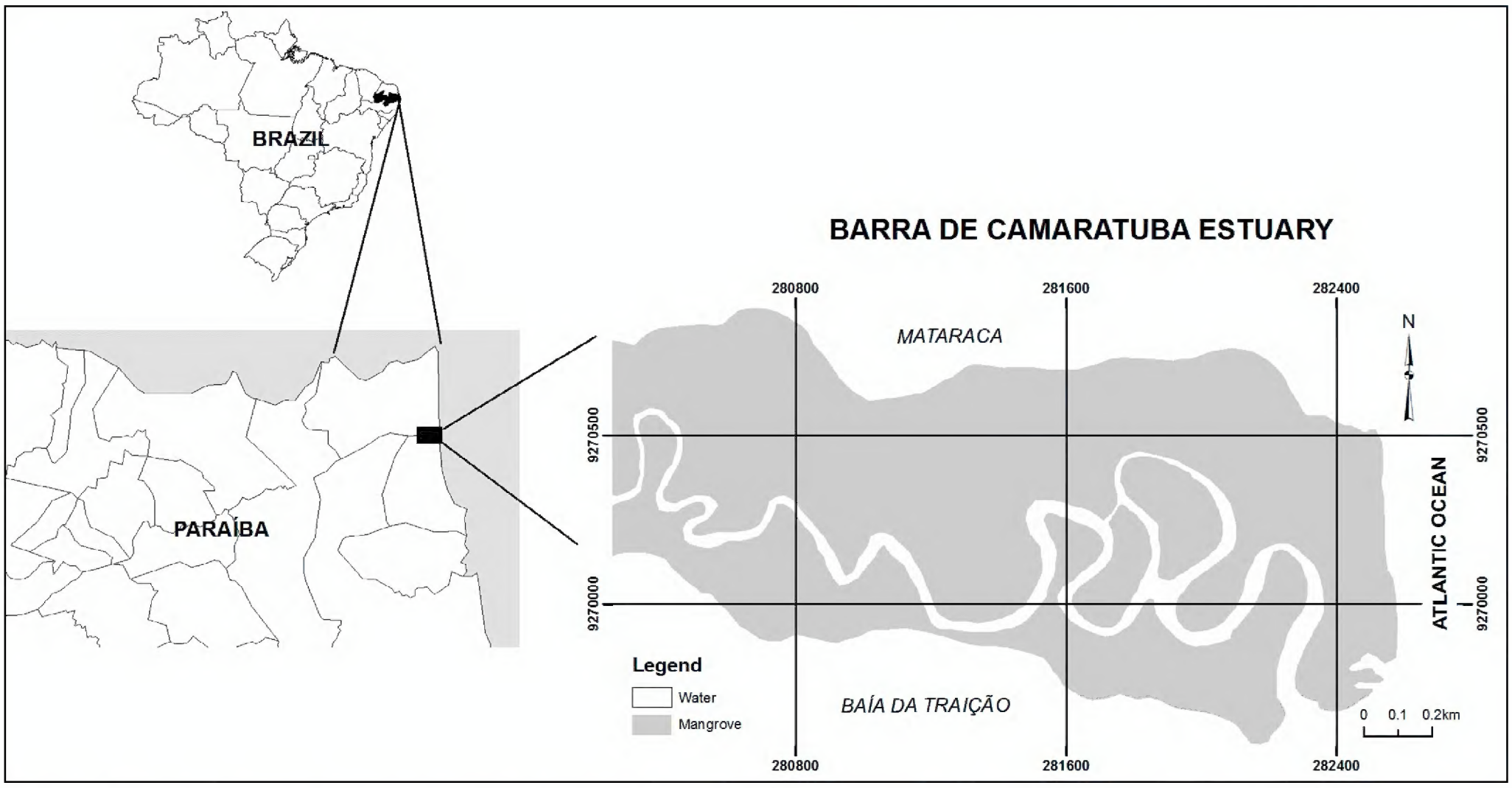

FIGURE 1. Location of Barra de Camaratuba estuary, between Marataca and Baía da Traição Municipalities, North of Paraiba State, Brazil.

The relative abundance was calculated as $RA = n_{sp} \times 100/T$, were RA = relative abundance; n_{sp} = number of individuals of each species; T = total of individuals. For each species, the constancy was calculated as $C = (p/P) \times 100$, were p = number of samples in which the species was recorded and P = total number of samples and the species were grouped in *Constant* (present in over 50% of the samples); *Accessory* (present in 25 to 50% of the samples) and *Accidental* (present in under 25% of the samples) (Dajoz 1983).

RESULTS

In Barra de Camaratuba estuary, 4656 specimens that correspond to 40 species, 27 genera, 20 families of Teleostei were captured. Among the families, those with the highest number of species were the Gerreidae, with six species (15.0%), followed by Lutjanidae and Tetraodontidae, with four species each, representing 10.0% of the species richness. Nine other families (Muraenidae, Engraulidae, Clupeidae, Ariidae, Atherinopsidae, Belonidae, Haemulidae, Serranidae and Polynemidae) are represented by one species only (2.5%). Among the 40 species identified, 13 were classified as Constant (32.5%), 11 as Accessory (27.5%), and 16 as Accidental (40.0%) (Table 1). Those with relative abundance greater than 10% were *Sciades herzbergii* (Bloch, 1794), an important estuarine resident species (Andrade-Turbino *et al*. 2008), *Mugil curema* Valenciennes, 1836, *Centropomus parallelus* Poey, 1860 and *Eugerres brasilianus* (Cuvier, 1830), all occurring in 100% of the samples. *Centropomus pectinatus* Poey, 1860 and *C. undecimalis* (Bloch, 1792) were also present in all samples, though in a relative abundance of less than 10%.

DISCUSSION

The local fishermen use regularly the "Tomada" to capture fish to be sold at the open fair in Mataraca Municipality. They usually sell *Mugil curema*, *Centropomus parallelus*, *C. pectinatus*, *C. undecimalis* and *Eugerres brasilianus*. These species are caught by this fishing technique all year around (100% Constancy), this shows that the goal with using this fish trap is reached by fishermen. But for the total of species, most of them were considered Accidental, as it is common in estuarine fishes (Viana *et al*. 2010).

The trap fisheries represents a small-scale fisheries and appear more balanced, exhibiting relatively few conflicts and in some cases, such as fish traps, present a number of traditional management measures that constitutes a form of management and control of fishery effort (Isaac *et al*. 2009). Nevertheless we note that the most part of the trapped specimens lack economic interest and are usually discarded by fishermen, which denotes the impact of this traditional fishing practice either in resident species or about those that use the estuary as growth and recruitment areas. Thus, like a first local assessment, this study demonstrates the ecological impact of a traditional fishing practice.

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LITERATURE CITED

Allen, G.R. 1985. *Snappers of the World: An Annotated and Illustrated Catalogue of Lutjanid Species Known to Date*. Rome: FAO. 208 pp.

Alvares, C.A., J.L. Stape, P.C. Sentelhas, J.L.M. Gonçalves and G. Sparovek. 2014. Köppen's climate classification map for Brazil. *Meteorologische Zeitschrift* 22(6): 711–728 (doi: 10.1127/0941-2948/2013/0507).

Andrade-Turbino, M.F., A.L. Ribeiro, M. Vianna. 2008. Organização espaço-temporal das ictiocenoses demersais nos ecossistemas estuarinos brasileiros: Uma síntese. *Oecologia Brasiliensis* 12: 640–661 (http://www.ppgecologia.biologia.ufrj.br/oecologia/index.php/oecologiabrasiliensis/article/view/259).

Barletta, M., A. Barletta-Bergan and U. Saint-Paul. 1998. Description of the fisheries structure in the mangrove-donated region of Bragança (State of Para, North Brazil). *Ecotropica* 4: 41–53.

Betancur-R., R., E. Wiley, N. Bailly, M. Miya, G. Lecointre and G. Ortí. 2014. *Phylogenetic Classification of Bony Fishes.* Version 3. Accessible at http://www.deepfin.org/Classification_v3.htm.

Table 1. List of species of the Teleostei collected in Barra de Camaratuba estuary in 2012 (n = number of individuals; RA = relative abundance (%); C = constancy (C = Constant; As = Accessory; Ad = Accidental). Classification by Betancur-R. *et al.* (2014).

TAXA	SPECIES	n	AR(%)	C(%)
Anguilliformes				
Muraenidae	*Gymnothorax funebris* Ranzani, 1839	1	0.02	Ad
Clupeiformes				
Engraulidae	*Anchovia clupeoides* (Swainson, 1839)	25	0.54	C
Clupeidae	*Harengula clupeola* (Cuvier, 1829)	1	0.02	Ad
Siluriformes				
Ariidae	*Sciades herzbergii* (Bloch, 1794)	989	21.24	C
Gobiiformes				
Eleotridae	*Eleotris pisonis* (Gmelin, 1789)	1	0.02	Ad
	Guavina guavina (Valenciennes, 1837)	3	0.06	Ad
Gobiidae	*Bathygobius soporator* (Valenciennes, 1837)	45	0.97	C
	Gobionellus oceanicus (Pallas, 1770)	2	0.04	Ad
Carangiaria*				
Centropomidae	*Centropomus parallelus* Poey,1860	554	11.90	C
	Centropomus pectinatus Poey,1860	277	5.95	C
	Centropomus undecimalis (Bloch, 1792)	125	2.68	C
Polynemidae	*Polydactylus virginicus* (Linnaeus, 1758)	21	0.45	As
Carangiformes				
Carangidae	*Carangoides bartholomaei* (Cuvier, 1833)	3	0.06	Ad
	Caranx latus Agassiz, 1831	1	0.02	Ad
Pleuronectiformes				
Paralichthyidae	*Citharichthys arenaceus* Evermann & Marsh, 1900	21	0.45	As
	Citharichthys spilopterus (Günther, 1862)	25	0.54	As
Achiridae	*Achirus declivis* Chabanaud, 1940	1	0.02	Ad
	Achirus lineatus (Linnaeus, 1758)	1	0.02	Ad
Atheriniformes				
Atherinopsidae	*Atherinella brasiliensis* (Quoy & Gaimard, 1825)	109	2.34	As
Beloniformes				
Belonidae	*Strongylura marina* (Walbaum, 1792)	6	0.13	As
Mugiliformes				
Mugilidae	*Mugil curema* Valenciennes, 1836	1128	24.23	C
	Mugil liza Günther, 1880	1	0.02	Ad
Eupercaria*				
Gerreidae	*Diapterus auratus* Ranzani, 1842	130	2.79	C
	Diapterus rhombeus (Cuvier, 1829)	180	3.87	As
	Eucinostomus argenteus Baird & Girard, 1855	70	1.50	Ad
	Eucinostomus gula (Quoy & Gaimard, 1824)	5	0.11	As
	Eucinostomus melanopterus (Bleeker, 1863)	54	1.16	C
	Eugerres brasilianus (Cuvier, 1830)	551	11.83	C
Lutjanidae	*Lutjanus alexandrei* Moura & Lindeman, 2007	52	1.12	As
	Lutjanus apodus (Walbaum, 1792)	18	0.39	As
	Lutjanus cyanopterus (Cuvier, 1828)	14	0.30	As
	Lutjanus jocu (Bloch & Schneider, 1801)	51	1.10	As
Haemulidae	*Pomadasys crocro* (Cuvier, 1830)	4	0.09	Ad
Sciaenidae	*Bardiella ronchus* (Cuvier, 1830)	46	0.99	C
	Stellifer naso (Jordan, 1889)	1	0.02	Ad
Tetraodontiformes				
Tetraodontidae	*Lagocephalus laevigatus* (Linnaeus, 1766)	1	0.02	Ad
	Sphoeroides greeleyi Gilbert, 1900	1	0.02	Ad
	Sphoeroides pachygaster (Müller & Troschel, 1848)	1	0.02	Ad
	Sphoeroides testudineus (Linnaeus, 1758)	100	2.15	C
Perciformes				
Serranidae	*Rypticus randalli* Courtenay, 1967	37	0.79	C
Total		4656		

* *insertae sedis* as interim solution.

Captured on 18 September 2014.
Dajoz, R. 1983. *Ecologia Geral* (4th ed.). Petrópolis: Vozes/EDUSP. 472 pp.
Figueiredo, J.L. and N.A. Menezes. 1978. *Manual de Peixes Marinhos do Sudeste do Brasil. II. Teleostei (1)*. São Paulo: USP/Museu de Zoologia. 110 pp.
Figueiredo, J.L. and N.A. Menezes. 1980. *Manual de Peixes Marinhos do Sudeste do Brasil. lI. Teleostei (2)*. São Paulo: USP/Museu de Zoologia. 90 pp.
Figueiredo, J.L. and N.A. Menezes. 2000. *Manual de Peixes Marinhos do Sudeste do Brasil. VI. Teleostei (5)*. São Paulo: USP/Museu de Zoologia. 116 pp.
Harrison, I.J. 2002. Mugilidae; pp. 1071–1085, in: K.E. Carpenter (ed.). *The Living Marine Resources of the Western Central Atlantic, Volume II. Bony Fishes Part 1 (Acipenseridae to Grammatidae)*. FAO Species Identification Guide for Fisheries Purposes and American Society of Ichthyologists and Herpetologists. Special Publication 5, Rome.
Isaac, V.J., R.V.E. Santo, B. Bentes, F.L. Frédou, K.R.M. Moura and T. Frédou. 2009. An interdisciplinary evaluation of fishery production systems off the state of Pará in North Brazil. *Journal of Applied Ichthyology* 25: 244–255 (doi: 10.1111/j.1439-0426.2009.01274.x).
Marceniuk, A.P. 2005. Chave para identificação das espécies de bagres marinhos (Siluriformes, Ariidae) da costa brasileira. *Boletim do Instituto de Pesca*. 31(2): 89–101 (ftp://ftp.sp.gov.br/ftppesca/31_2_89-101.pdf).
Marceniuk, A.P. and N.A. Menezes. 2007. Systematics of the family Ariidae (Ostariophysi, Siluriformes) with a redefinition of the genera. *Zootaxa* 1416: 1–126 (http://www.mapress.com/zootaxa/2007f/zt01416p126.pdf).
Menezes, N.A. and J.L. Figueiredo. 1980. *Manual de Peixes Marinhos do Sudeste do Brasil. IV. Teleostei (3)*. São Paulo: USP/Museu de Zoologia. 96 pp.
Menezes, N.A. and J.L. Figueiredo. 1985. *Manual de Peixes Marinhos do Sudeste do Brasil. IV. Teleostei (4)*. São Paulo: USP/Museu de Zoologia. 105 pp.
Nelson, J.S. 2006. *Fishes of the World* (4th ed.). Hoboken: John Wiley & Sons. 601 pp.
Nery, A.C. 1995. Traços da tecnologia pesqueira de uma área de pesca tradicional na Amazônia- Zona do Salgado-Pará. *Boletim do Museu Paraense Emílio Goeldi*, *Série Antropológica* 11(2): 199–293 (http://repositorio.museu-goeldi.br/jspui/bitstream/123456789/720/1/B%20MPEG%20Ant%2011(2)%201995%20NERY.pdf).
Ribeiro, M.A.F.M. 2012. Participação pública em Gestão de recursos hídricos: uma análise do caso paraibano. M.Sc. Dissertation. Campina Grande. Universidade Federal de Campina Grande. 167 pp. (http://www.coenge.ufcg.edu.br/publicacoes/Public_438.pdf).
Viana, A.P., F. Lucena Frédou, T. Frédou, M. F. Torres and A.O. Bordalo. 2010. Fish fauna as an indicator of environmental quality in an urbanized region of the Amazon estuary. *Journal of Fish Biology* 76: 467–486 (doi: 10.1111/j.1095-8649.2009.02487.x).

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